Department of Energy

Technical Support Document

Notice of Final Rulemaking
National Environmental Policy Act Implementing Procedures
(10 CFR Part 1021)

November 2020

This Technical Support Document supplements the Department of Energy's (DOE's) Notice of Final Rulemaking to update its National Environmental Policy Act (NEPA) regulations (10 CFR 1021) regarding authorizations under section 3 of the Natural Gas Act (15 U.S.C. 717). See 85 FR 78197, December 4, 2020, at https://beta.regulations.gov/docket/DOE-HQ-2020-0017. Each of the documents cited below are incorporated, in their entirety, into DOE's record for this rulemaking.

Technical Studies

LNG Monthly 2020 (Office of Fossil Energy, U.S. Department of Energy): https://www.energy.gov/fe/downloads/lng-monthly-2020.

Among the reported data:

- Calculated from the number of rows for each year (2017–2019) in the tab "LNG Exports – Repository" in LNG 2020.xlsx: LNG shipments associated with DOE export authorizations numbered 209 in 2017, 330 in 2018, and 563 in 2019.

Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States: 2019 Update (U.S. Department of Energy, National Energy Technology Laboratory, September 12, 2019): https://www.energy.gov/sites/prod/files/2019/09/f66/2019%20NETL%20LCA-GHG%20Report.pdf

- (Page 32) "This analysis has determined that the use of U.S. LNG exports for power production in European and Asian markets will not increase GHG emissions from a life cycle perspective, when compared to regional coal extraction and consumption for power production."

LNG Information Paper #3, LNG Ships, 2019 Update (GIIGNL - The International Group of Liquefied Natural Gas Importers): https://giignl.org/sites/default/files/PUBLIC_AREA/About_LNG/4_LNG_Basics/giignl2019_infopapers3.pdf

This paper describes the transport of liquefied natural gas (LNG) in large ships known as LNG carriers and summarizes the international security measures established by the International Maritime Organisation (IMO).

Among the paper's findings:

- (Page 1) "Since the first cargoes of LNG were shipped on a regular commercial basis in 1964, almost 100,000 shipments have been made without a single incident of LNG being lost through a breach or failure of the ship's tanks." The paper further noted that, "There have been a few major grounding incidents, but none resulted in loss of cargo" due to the "robust design of the ships and cargo tanks and the LNG industry's extraordinary attention to safety details."

- (Page 3) "LNG ships must comply with all relevant local and international regulatory requirements including those of the International Maritime Organisation (IMO), International Gas Carriers Code (IGC) and US Coast Guard (USCG).

  "All LNG ships have double hulls. The cargo is normally carried near atmospheric pressure in specially insulated tanks, referred to as the cargo containment system inside the inner hull, although some smaller carriers and bunker barges have tanks capable of operating at pressures of up to 10 barg. International codes govern the design and construction of gas carriers. There are additional international requirements set out in the codes which vary with the type of cargo that the ship will carry." [Barg is a unit of pressure with 1 barg approximately equal to atmospheric pressure.]

- (Page 4) "As a result of the acts of terrorism in the US on September 11, 2001, IMO agreed to new amendments to the 1974 SOLAS (International Convention for the Safety of Life At Sea) addressing port facility and ship security. In 2003, IMO adopted the International Ship and Port Facility Security (ISPS) Code. This code requires that vulnerability assessments be conducted for ships and ports and that security plans be developed. The purpose of the ISPS code is to prevent and suppress terrorism against ships; improve security aboard ships and ashore; and reduce risk to people (including passengers, crew, and port personnel on board ships and in port areas), and to vessels and cargoes. Cargo vessels 300 gross tons and larger, including all LNG vessels, as well as ports servicing those regulated vessels, must adhere to these IMO and SOLAS standards."

- (Page 6) "LNG tankers have sailed over 92,000 voyages without major accident or loss of cargo."

Review of Maritime Transport 2019 (United Nations Conference on Trade and Development): https://unctad.org/en/PublicationsLibrary/rmt2019_en.pdf

- (Page xii) "In recent years, environmental sustainability has become a major policy concern in global maritime transport. Environmentally driven regulations are increasingly affecting shipping market dynamics. In 2018, fuel economy and environmental sustainability were burning issues, and this trend will continue in 2019 and beyond."

- (Page xii) "The new IMO 2020 regulation, bringing the sulphur cap in fuel oil for ships down from 3.50 per cent to 0.50 per cent, is expected to bring significant benefits for human health and the environment. The regulation will enter into force on 1 January 2020. Enforcement, compliance with and monitoring of the new sulphur limit is the responsibility of States party to the International Convention for the Prevention of Pollution from Ships (MARPOL), 1973, as modified by the Protocol of 1978 (MARPOL 73/78), annex VI. Ships found to be not in compliance may be detained by port State control inspectors, and/or sanctions may be imposed for violations. An additional amendment to MARPOL 73/78 will enter into force on 1 March 2020. The amendment will prohibit not only the use, but also the carriage of non-compliant fuel oil for combustion purposes for propulsion or operation on board a ship, unless it is fitted with a scrubber, which is an exhaust-gas cleaning system."

- (Pages 70–71) "The International Convention for the Control and Management of Ships' Ballast Water and Sediments (2004) entered into force in September 2017. The Convention aims to prevent the risk of the introduction and proliferation of non-native species following the discharge of untreated ballast water from ships. One way to reduce this risk is to install ballast water treatment systems. . . . Larger and newer ships that trade internationally are more likely to have ballast water treatment systems installed than smaller and older ships that may be deployed mostly in national waters. Accordingly, the ship types that have the largest share of ballast water treatment systems installed are liquefied gas carries (28.76 per cent), dry bulk carriers (23.32 per cent) and container ships (18.88 per cent) (table 3.6)."

Freight Facts and Figures 2017 (Bureau of Transportation Statistics, U.S. Department of Transportation): https://rosap.ntl.bts.gov/view/dot/34923.

Among the reported data:

- (Page 28) "In 2015, 7,836 oceangoing vessels made 82,044 calls at U.S. ports, a 36.8 percent increase since 2005. Tankers accounted for 40.4 percent of total calls, followed by containerships (22.8 percent) and dry bulk vessels (16.7 percent)."

Table 3-16 Number of Vessel Calls at U.S. Ports: 2005, 2010, and 2013–2015 (vessels weighing 10,000 deadweight tons or greater)

Type	2005	(R) 2010	2013	2014	2015	Percent change, 2005–2015
Tanker	19,900	20,621	30,167	32,582	33,106	66.4
Container	18,532	19,466	19,920	19,743	18,711	1.0
Dry Bulk	11,191	9,162	10,946	14,064	13,666	22.1
Roll on/Roll off	5,626	5,838	5,909	6,233	7,065	25.6
Gas (LPG/LNG)	876	697	1,261	1,352	1,703	94.4
General Cargo	3,839	3,544	7,484	18,34	7,793	103.0
All types	**59,964**	**59,328**	**75,687**	**82,288**	**82,044**	**36.8**

KEY: R = revised.

NOTE: Deadweight tons (DWT) is a measurement of the capacity of a vessel. DWT is defined as the total weight (metric tons) of cargo, fuel, fresh water, stores and crew that a ship can carry when immersed to its load line.

SOURCE: U.S. Department of Transportation, Maritime Administration, *Vessel Calls in U.S. Ports* (Washington, DC: annual issues), available at www.marad.dot.gov/resources/data-statistics/ as of August 2016."

Transportation Study: Impacts Associated with New and Emerging Natural Gas Liquefaction Facilities, Phase 1 Whitepaper (U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Hazardous Materials Safety, 2016): https://rosap.ntl.bts.gov/view/dot/36455

Among the study's findings:

- (Page 4) The study describes four elements that provide multiple layers of safety: primary containment, secondary containment, safeguard systems, and safety zones around LNG ships.
- (Page 13) "The USCG determines the suitability of every LNG ship that delivers cargoes into and out of the U.S. through a rigorous annual inspection. If a ship fails the inspection, all deficiencies must be fixed before it can unload its cargo or leave the country. LNG ships are issued a Certificate of Compliance by the USCG to state that they are in complete compliance with U.S. regulations." [Footnote omitted.]

- (Page 13) "As LNG ships are double-hulled, with more than six feet of void space or water ballast between the outer and inner hulls and the cargo tanks, the double hulls help to prevent leakage or rupture in the event of an accident. LNG ships are also equipped with sophisticated leak detection technology, ESD [emergency shutdown] systems, advanced radar and positioning systems, and numerous other technologies designed to ensure the safe and secure transport of LNG."
- (Page 13) "Studies undertaken by various technical authorities and Sandia National Laboratories on LNG shipping safety and security confirm that risks from accidental LNG spills, including as a result of collisions and groundings, are highly unlikely due to the rigorous safety policies and practices put in place by the LNG industry. Risks resulting from intentional events, such as terrorist acts, can be greatly reduced with appropriate security, planning, mitigation, and prevention, and the LNG carrier industry has these precautions in place." [Footnote omitted.]
- (Page 14) "The LNG industry carefully follows requirements set forth by the IMO, FERC, U.S. DOT [U.S. Department of Transportation], and USCG, and works closely with the U.S. Department of Homeland Security (DHS) to ensure that its operations are safe and secure."

Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States (U.S. Department of Energy, August 2014): https://www.energy.gov/fe/addendum-environmental-review-documents-concerning-exports-natural-gas-united-states

- (Page 2) "Accordingly, to provide the public with a more complete understanding of potential impacts, DOE has prepared this discussion of potential environmental issues associated with unconventional gas production in the lower-48 states. By preparing this discussion of natural gas production activities, DOE is going beyond what NEPA requires. While DOE has made broad projections about the types of resources from which additional production may come, DOE cannot meaningfully estimate where, when, or by what method any additional natural gas would be produced. Therefore, DOE cannot meaningfully analyze the specific environmental impacts of such production, which are nearly all local or regional in nature. Nor can DOE meaningfully consider alternatives or mitigation measures as they relate to natural gas production, given that DOE's regulatory jurisdiction extends only to the act of exportation."

Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States (U.S. Department of Energy, National Energy Technology Laboratory, May 29, 2014): https://www.energy.gov/fe/life-cycle-greenhouse-gas-perspective-exporting-liquefied-natural-gas-united-states

- (Page 18) "This analysis has determined that the use of U.S. LNG exports for power production in European and Asian markets will not increase GHG emissions, on a life cycle perspective, when compared to regional coal extraction and consumption for power production. Given the uncertainty in the underlying model data, it is not clear if there are any significant differences between the corresponding European and Asian cases other than the LNG transport distance from the U.S. and the pipeline distance from Russia. Differences between the U.S LNG, regional LNG, and Russian natural gas options are also indeterminate due to the underlying uncertainty in the modeling data, therefore no significant increase or decrease in net climate impact is anticipated from any of these scenarios."

Liquefied Natural Gas Safety Research (U.S. Department of Energy Report to Congress, 2012): https://www.energy.gov/fe/downloads/lng-safety-research-report-congress and related **The Phoenix Series Large Scale LNG Pool Fire Experiments** (Sandia National Laboratories, 2011): https://prod-ng.sandia.gov/techlib-noauth/access-control.cgi/2010/108676.pdf

The reports present test data from fire experiments intended to improve hazard prediction techniques for large LNG spills and fires. In general, the reports do not address the likelihood that analyzed fire scenarios could occur. Results from the experiments help inform improvements to safety and risk management in the LNG industry and practices by regulatory bodies. The experiments were conducted in response to a 2007 Government Accountability Office report described below. Among the conclusions presented in the DOE Report to Congress:

- (Page iii) For the large breach and spill events considered, as much as 40 percent of the LNG spilled from the LNG vessel's cargo tank is likely to remain within an LNG vessel's structure, leading to extensive cryogenic fracturing and damage to the LNG vessel's structural steel. In addition to the cryogenic damage, the heat fluxes expected from an LNG pool fire would severely degrade the structural strength of the inner and outer hulls of an LNG vessel. The extent of the cryogenic and fire damage on an LNG vessel resulting from large spills and associated pool fires would significantly impact the LNG vessel's structural integrity, causing the vessel to be disabled, severely damaged, and at risk of sinking.
- (Page iii) Current LNG vessel and cargo tank design, materials, and construction practices are such that simultaneous, multi-cargo tank cascading damage spill scenarios are extremely unlikely, though sequential multi-cargo tank cascading damage spill scenarios may be possible. Should sequential cargo tank spills occur, they are not expected to increase the hazard distances resulting from an initial spill and pool fire; however, they could increase the duration of the fire hazards.
- (Page iii) Based on the data collected from the large-scale LNG pool fire tests conducted, thermal (fire) hazard distances to the public from large LNG pool fires will decrease by at least two to seven percent compared to results obtained from previous studies.
- (Page iii) Risk management strategies to reduce potential LNG vessel vulnerability and damage from breach events that can result in large spills and fires should be considered for implementation as a means to eliminate or reduce both short-term and long-term impacts on public safety, energy security and reliability, and harbor and waterways commerce. Approaches to be considered should include implementation of enhanced operational security measures, review of port operational contingency plans, review of emergency response coordination and procedures, and review of LNG vessel design, equipment and operational protocols for improved fire protection.

Liquefied Natural Gas (LNG) Import Terminals: Siting, Safety, and Regulation (Congressional Research Service, 2009): https://crsreports.congress.gov/product/pdf/RL/RL32205

Among the report's findings:

- (Page 6) "The LNG tanker industry claims a record of relative safety over the last 50 years; since international LNG shipping began in 1959, tankers have carried over 45,000 LNG cargoes and traveled over 128 million miles without a serious accident at sea or in port [as reported in 2009]. LNG tankers have experienced groundings and collisions during this period, but none has resulted in a major spill. The LNG marine safety record is partly due to the double-hulled design of LNG tankers." [Footnotes omitted.]
- (Page 6) "LNG tankers also carry radar, global positioning systems, automatic distress systems and beacons to signal if they are in trouble. Cargo safety systems include instruments that can shut operations if they deviate from normal as well as gas and fire detection systems." [Footnote omitted.]

- (Page 15) "The USCG [US Coast Guard] has authority to review, approve, and verify plans for marine traffic around proposed onshore LNG marine terminals as part of the overall siting approval process led by FERC [Federal Energy Regulatory Commission]. The USCG is responsible for issuing a Letter of Recommendation regarding the suitability of waterways for LNG vessels serving proposed terminals. The agency is also responsible for ensuring that full consideration is given in siting application reviews to the safety and security of the port, the LNG terminal, and the vessels transporting LNG. The USCG acts as a cooperating agency in the evaluation of LNG terminal siting applications."

Public Safety Consequences of a Terrorist Attack on a Tanker Carrying Liquefied Natural Gas Need Clarification (United States Government Accountability Office, 2007): https://www.gao.gov/new.items/d07316.pdf

Among the report's findings:

- (Page 7) "The six unclassified studies we reviewed all examined the heat impact of an LNG pool fire but produced varying results; some studies also examined other potential hazards of a large LNG spill and reached consistent conclusions on explosions. Specifically, the studies' conclusions about the distance at which 30 seconds of exposure to the heat could burn people ranged from about 500 meters (less than 1/3 of a mile) to more than 2,000 meters (about 1-1/4 miles). The Sandia National Laboratories' study concluded that the most likely distance for a burn is about 1,600 meters (1 mile). These variations occurred because researchers had to make numerous modeling assumptions to scale-up the existing experimental data for large LNG spills since there are no large spill data from actual events. These assumptions involved the size of the hole in the tanker, the number of tanks that fail, the volume of LNG spilled, key LNG fire properties, and environmental conditions, such as wind and waves. Three of the studies also examined other potential hazards of an LNG spill, including LNG vapor explosions, asphyxiation, and cascading failure. All three studies considered LNG vapor explosions unlikely unless the LNG vapors were in a confined space. Only the Sandia National Laboratories' study examined asphyxiation, and it concluded that asphyxiation did not pose a hazard to the general public. Finally, only the Sandia National Laboratories' study examined the potential for cascading failure of LNG tanks and concluded that only three of the five tanks would be involved in such an event and that this number of tanks would increase the duration of the LNG fire."
- (Page 7) "Our panel of 19 experts generally agreed on the public safety impact of an LNG spill, disagreed with a few conclusions reached by the Sandia National Laboratories' study, and suggested priorities for research to clarify the impact of heat and cascading tank failures. Experts agreed that (1) the most likely public safety impact of an LNG spill is the heat impact of a fire; (2) explosions are not likely to occur in the wake of an LNG spill, unless the LNG vapors are in confined spaces; and (3) some hazards, such as freeze burns and asphyxiation, do not pose a hazard to the public. Experts disagreed with the heat impact and cascading tank failure conclusions reached by the Sandia National Laboratories' study, which the Coast Guard uses to prepare WSAs [Waterway Suitability Assessments]. Specifically, all experts did not agree with the heat impact distance of 1,600 meters. Seven of 15 experts thought Sandia's distance was "about right," and the remaining eight experts were evenly split as to whether the distance was "too conservative" or "not conservative enough" (the other 4 experts did not answer this question). Experts also did not agree with the Sandia National Laboratories' conclusion that only three of the five LNG tanks on a tanker would be involved in a cascading failure. Finally, experts suggested priorities to guide future research aimed at clarifying uncertainties about heat impact distances and cascading failure, including large-scale fire experiments, large-scale LNG spill experiments on water, the potential for cascading failure of multiple LNG tanks, and improved modeling techniques. DOE's recently funded study involving large-scale LNG fire experiments addresses some, but not all, of the research priorities identified by the expert panel.

We are recommending that DOE incorporate into its current LNG study the key issues identified by the expert panel. We particularly recommend that DOE examine the potential for cascading failure of LNG tanks."

NEPA Review Example

Rio Grande LNG Project EIS (Federal Energy Regulatory Commission, 2019), adopted by DOE as DOE/EIS-0519: https://www.energy.gov/nepa/downloads/doeeis-0519-final-environmental-impact-statement (Similar topics also are addressed in other FERC EISs adopted by DOE, such as Texas LNG Project EIS, DOE/EIS-0520, https://www.energy.gov/nepa/downloads/doeeis-0520-final-environmental-impact-statement)

4.3.2.2 Surface Water Impacts and Mitigation

LNG Terminal

- (Page 4-43) "The Coast Guard's ballast water management regulations (33 CFR 151.2025 and 46 CFR 162) established a standard for the allowable concentration of living organisms in ships' ballast water discharged into waters of the United States. The Coast Guard also established engineering requirements and an approval process for ballast water treatment systems installed on ships. All ships calling on U.S. ports must either carry out open sea exchange of ballast water or ballast water treatment, in addition to fouling and sediment management, and document these activities in the ship's log book. In 2017, the International Convention for the Control and Management of Ships' Ballast Water and Sediments developed measures that must be implemented to minimize the potential for introduction of non-native species through ballast water. These measures have since been adopted by the International Maritime Organization (IMO) and are required to be implemented in all ships engaged in international trade.

  While the open sea exchange of ballast water has been used in the past and reduces the potential for non-native species introductions, on-board ballast water treatment systems are more effective at removing non-native species from ballast water. There are two different standards that ships must meet. All new ships must meet the "D-2" performance standard, which establishes the maximum number of viable organisms allowed to be discharged in ballast water. Conformity with the D-2 standard requires ships to utilize on-board ballast water treatment systems. Existing ships that do not currently have on-board ballast water treatment systems must continue to, at a minimum, conduct open sea exchanges of ballast water ("D-1" standard). Eventually, all ships will be required to conform with the D-2 standard. The timetable for conformity with the D-2 standard for existing ships is based on the date of the ship's International Oil Pollution Prevention Certificate renewal survey, which occurs every 5 years (IMO 2017). Therefore, most ships calling on the Project, estimated to begin in Year 4 of construction, would be expected to have conformed to D-2 standards."

4.7.1 Federally Listed Threatened and Endangered Species

4.7.1.1 Sea Turtles

Sea Turtle Impacts and Mitigation

- (Page 4-136) "In general, sea turtles are rare visitors to the immediate Project area and are more likely to be encountered along the LNG carrier transit routes in the Gulf of Mexico and nearshore waters. Many of the sea turtles that could be present have feeding, swimming, or resting behaviors that keep them near the surface, where they may be vulnerable to vessel strikes, especially if the turtles are cold-stunned from cold weather events. To help reduce the risk of strikes or other potential disturbances associated with the presence of additional marine traffic in proximity to the LNG Terminal. RG LNG's support vessels would adhere to the measures outlined in the NMFS Vessel Strike Avoidance Measures and Reporting for Mariners (revised February 2008); RG LNG would

also request that operators of LNG carriers and associated tugs calling on the LNG Terminal follow these procedures, but could not enforce their use."

- (Page 4-136) "We received a comment on the draft EIS requesting that we further consider the potential for vessel strikes of sea turtles from LNG carriers calling at the LNG Terminal, as RG LNG [Rio Grande LNG] could not enforce the use of NMFS' Vessel Strike Avoidance Measures and Reporting for Mariners on the various LNG vessels that would be serving the Project. . . . Although boat strikes may not always be obvious as the pathway for stranding/salvage, the data indicate that boat strikes are not the leading cause of sea turtle strandings. Further, boating activities are prevalent in the inshore and offshore areas of Statistical Zone 21, indicating that the chances of an individual boat striking a sea turtle is so small as to be discountable. Therefore, the addition of 6 LNG carriers per week to BSC and Gulf waters would not be likely to adversely affect sea turtles through vessel strike."

4.7.1.2 Marine Mammals

Whales

- (Page 4-143) "Whales could be vulnerable to vessel strikes during operation of the proposed LNG terminal. Vulnerability to collision with LNG carriers would be greatest while these animals feed, swim, and rest near the surface of the water. In areas of intense ship traffic, whales can experience propeller or collision injuries. The LNG carriers would use established and well-traveled shipping lanes, and as described in section 4.7.1.1, RG LNG would provide the operators of LNG carriers with NMFS' Vessel Strike Avoidance Measures and Reporting for Mariners (NMFS 2008) and request that these measures be used when transiting to and from the Rio Grande LNG Terminal. Based on the whales' characteristics and habitat requirements, and because RG LNG would provide the operators of LNG carriers with NMFS' recommended strike avoidance measures, we have determined that ship strikes are not anticipated and the Rio Grande LNG Project is not likely to adversely affect federally listed whales."

4.12.1 LNG Terminal

4.12.1.1 LNG Facility Reliability, Safety, and Security Regulatory Oversight

- (Page 4-304) "The safety, security, and reliability of the Rio Grande LNG Project would be regulated by the DOT, the Coast Guard, and the FERC. In February 2004, the DOT, the Coast Guard, and the FERC entered into an Interagency Agreement to ensure greater coordination among these three agencies in addressing the full range of safety and security issues at LNG terminals and LNG marine vessel operations, and maximizing the exchange of information related to the safety and security aspects of LNG facilities and related marine operations. Under the Interagency Agreement, the FERC is the lead federal agency responsible for the preparation of the analysis required under NEPA for impacts associated with LNG terminal construction and operation. The DOT and the Coast Guard participate as cooperating agencies but remain responsible for enforcing their regulations covering LNG facility siting, design, construction, operation, and maintenance. All three agencies have some oversight and responsibility for the inspection and compliance during the LNG Terminal's operation.

- (Page 4-305) The Coast Guard has authority over the safety of an LNG terminal's marine transfer area and LNG marine vessel traffic, as well as over security plans for the entire LNG terminal and LNG marine traffic. The Coast Guard regulations for waterfront facilities handling LNG are codified in 33 CFR 105 and 33 CFR 127. As a cooperating agency, the Coast Guard assists the FERC staff in evaluating whether an applicant's proposed waterway would be suitable for LNG marine vessel traffic and whether the waterfront facilities handling LNG would be operated in accordance with 33 CFR 105 and 33 CFR 127. If the facilities are constructed and become operational, the facilities would be subject to the Coast Guard inspection program to ensure compliance with the requirements

of 33 CFR 105 and 33 CFR 127."

4.12.1.3 Coast Guard Safety Regulatory Requirements and Letter of Recommendation

LNG Marine Vessel Historical Record

- (Page 4-309) "Since 1959, ships have transported LNG without a major release of cargo or a major accident involving an LNG marine vessel. There are more than 370 LNG marine vessels in operation routinely transporting LNG between more than 100 import/export terminals currently in operation worldwide. Since U.S. LNG terminals first began operating under FERC jurisdiction in the 1970s, there have been thousands of individual LNG marine vessel arrivals at terminals in the U.S. For more than 40 years, LNG shipping operations have been safely conducted in U.S. ports and waterways.

  A review of the history of LNG maritime transportation indicates that there has not been a serious accident at sea or in a port which resulted in a spill due to rupturing of the cargo tanks. However, insurance records, industry sources, and public websites identify a number of incidents involving LNG marine vessels, including minor collisions with other marine vessels of all sizes, groundings, minor LNG releases during cargo unloading operations, and mechanical/equipment failures typical of large vessels."

LNG Marine Vessel Safety Regulatory Oversight

- (Page 4-311) "The Coast Guard exercises regulatory authority over LNG marine vessels under 46 CFR 154, which contains the United States safety standards for self-propelled LNG marine vessels transporting bulk liquefied gases. The LNG marine vessels visiting the proposed facility would also be constructed and operated in accordance with the IMO *Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* and the *International Convention for the Safety of Life at Sea*. All LNG marine vessels entering U.S. waters are required to possess a valid IMO Certificate of Fitness and either a Coast Guard Certificate of Inspection for U.S. flag vessels or a Coast Guard Certificate of Compliance for foreign flag vessels. These documents certify that the LNG marine vessel is designed and operating in accordance with both international standards and the U.S. regulations for bulk LNG marine vessels under 46 CFR 154.

  The LNG marine vessels which would deliver or receive LNG to or from the proposed Project would also need to comply with various U.S. and international security requirements. The IMO adopted the *International Ship and Port Facility Security Code* in 2002. This code requires both ships and ports to conduct vulnerability assessments and to develop security plans. The purpose of the code is to prevent and suppress terrorism against ships; improve security aboard ships and ashore; and reduce the risk to passengers, crew, and port personnel on-board ships and in port areas."

4.13.2.4 Aquatic Resources and EFH [Endangered Fish Habitat]

LNG Terminal

- (Page 4-439) "In addition, ballast water can be a source for introduction of non-native species, as discussed in section 4.6.2.2. The cumulative increase in vessel traffic within the BSC would create greater opportunity for the introduction of non-native species in ballast water. However, all LNG carriers and other ocean-going vessels utilizing the BSC would be required to adhere to the Coast Guard regulations and IMO requirements regarding ballast water to minimize the potential introduction of non-native species; therefore, cumulative impacts on aquatic resources from ballast water would be negligible. In slight contrast, with regards to the physiochemical composition of the water within the maneuvering basin, ballast water discharges can result in localized changes. As discussed in section 4.13.2.2, these impacts would be localized and would quickly return to ambient levels. Impacts from changes in water quality on aquatic resources would be similar to those described above for cooling water."